

# Safety Impacts of Access Management Techniques in Utah

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## Outline

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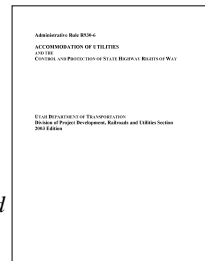


## Introduction

- Traffic volumes and congestion in Utah have increased in recent years
- One of the primary areas of congestion are arterial streets, which according to the AASHTO Green Book should provide "...a high operating speed and level of service"
- Utah has placed an increased emphasis on *access management techniques* to help manage this congestion

## Introduction

- The Utah Department of Transportation (UDOT) recently established state law to help control access management:
  - *Administrative Rule R930-6: Accommodation of Utilities and the Control and Protection of State Highway Rights of Way*

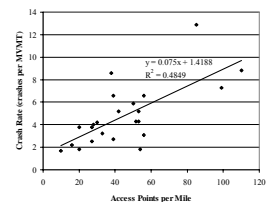


## Introduction

- One of the topics addressed in the Administrative Rule is **raised medians**
- UDOT was interested to determine if raised medians are an effective safety tool
- The purpose of this paper is to present the results of an assessment on the safety impacts of access management techniques (primarily raised medians) in Utah

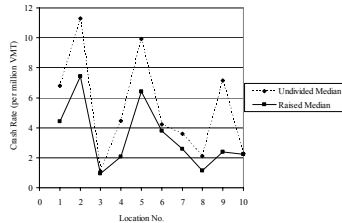
## Background

- Access management techniques have generally been shown to have a positive impact on safety
- Access point density has been shown to be positively correlated with crash rates



## Background

- Corner clearance is anticipated to impact crash rates
- The type of median has a direct impact on the safety of the corridor



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## Background

- Previous studies on access management and raised median safety have been performed outside of Utah
- There was a need to determine the safety benefits provided by access management techniques within the state and to develop a methodology wherein this data could continually be monitored

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## Crash Database

- To complete this evaluation, a GIS enabled web delivered data almanac (i.e., crash database) was used
- The crash database allowed researchers to evaluate crash data



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## Crash Database

- The system was designed to enhance the analysis of the data through the:
  - Generation of custom tables and reports
  - Placement of the data on a "smart map" to visually identify hot spots or deficient areas
  - Ability to extract information through queries and save the data into a single file for analysis
  - Ability of shorten data collection time

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## Corridor Selection

- To analyze the results of access management techniques, a sample of corridors was selected
- The corridors included locations where access management techniques (i.e., raised medians and/or driveway consolidation) had been installed



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## Corridor Selection

- The analysis corridors included:
  - University Parkway (SR 265)
  - Alpine Highway (SR 74)
  - State Street (SR 89)
  - 400/500 South (SR 186)
  - 300 West (SR 89)
  - Redwood Road (SR 68)



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## Corridor Selection

- Several corridors were also selected as control sites
- The control sites included:
  - 700 East (SR 71)
  - 12300 South (SR 71)
  - Redwood Road (SR 68)
  - St. George Blvd. (SR 34)
  - SR 36



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## Analysis Procedure

- A set procedure was established to analyze the data that began with a thorough inspection of the site and proceeded through full analysis using the crash database

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## Analysis Procedure

- Several analyses were performed including:
  - Segment analysis
  - Intersection analysis
  - Collision type analysis
  - Crash severity analysis



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## Analysis Results

- Results are summarized for Redwood Road (SR 68):
  - Raised median installed in 1994
  - Data analyzed from 1992 to 1993 and again from 1995 to 1997



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## Redwood Road Analysis Results

- Crash data and access point density for Redwood Road:
  - Crash rate decreased 13%
  - Number of access points per mile decreased 26%
  - AADT increased 12%

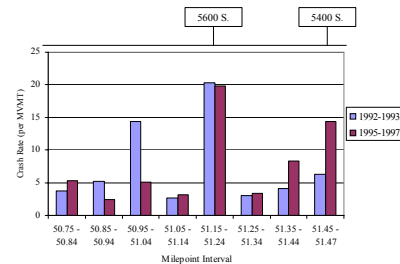
	Before (1992-1993)	After (1995-1997)
Crashes Per Year	112.5	110.3
Crash Rate (Crashes/MVMT <sup>1</sup> )	8.36	7.25
Fatality Rate (Fatalities/100 MVMT <sup>1</sup> )	0.00	0.00
Access Points	27	20
Length of Section (mi.)	0.73	0.73
Access Points per Mile	37.0	27.4
AADT <sup>2</sup>	50,490	57,082

<sup>1</sup>MVMT = Million Vehicle Miles Traveled  
<sup>2</sup>AADT is a weighted average for the segment

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## Redwood Road Analysis Results

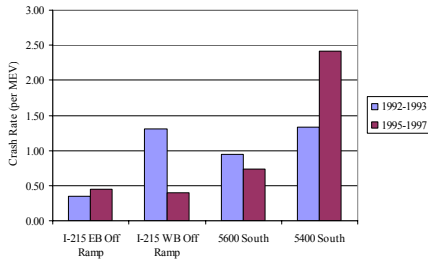
- Crash rates for one-tenth-mile intervals:



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## Redwood Road Analysis Results

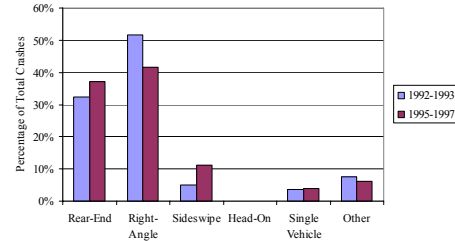
### Intersection crash rates:



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## Redwood Road Analysis Results

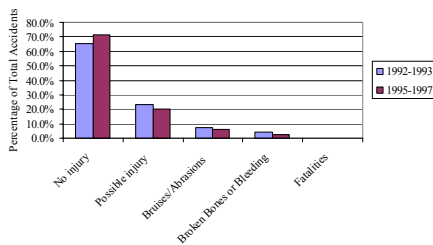
### Collision types as a percentage of total crashes:



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## Redwood Road Analysis Results

### Severity of crashes as a percentage of total crashes:



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## Redwood Road Analysis Results

### Cost of crashes:

- As a result of the reduction in severity, the overall cost of crashes per year decreased by approximately \$565,000 per year

Crash Severity	Unit Cost	Before (1992-1993)	After (1995-1997)
No injury	\$ 4,500	\$ 661,500	\$1,062,000
Possible injury	\$ 25,000	\$1,300,000	\$1,650,000
Bruises/Abrasions	\$ 48,000	\$ 816,000	\$1,008,000
Broken Bones or Bleeding Wounds	\$ 228,000	\$2,052,000	\$1,824,000
Fatalities	\$2,720,000	\$ 0	\$ 0
<b>Total Cost of Crashes</b>		<b>\$4,829,500</b>	<b>\$5,544,000</b>
<b>Cost of Crashes Per Year</b>		<b>\$2,414,750</b>	<b>\$1,848,000</b>

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## Summary Analysis Results

### Changes in collision types at Analysis Locations:

Analysis Locations	Types of Collisions					
	Rear-End	Right-Angle	Sideswipe	Head-on	Single Vehicle	Other
University Parkway	•	○	○	-	•	•
Alpine Highway	○	•	•	-	•	○
State Street	•	○	○	-	○	○
400/500 South	•	○	•	-	•	○
300 West	○	○	-	-	○	•
Redwood Road	•	○	•	-	•	○

"•" indicates an increase  
 "○" indicates a decrease  
 "-" indicates no change

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## Summary Analysis Results

### Changes in crash severity at analysis locations:

Analysis Locations	Crash Severity				
	No Injury	Possible Injury	Bruises/Abrasions	Broken Bones or Bleeding	Fatalities
University Parkway	•	•	•	○	○
Alpine Highway	○	•	•	•	-
State Street	•	•	•	○	○
400/500 South	•	○	○	○	•
300 West	○	•	•	○	-
Redwood Road	•	○	○	○	-

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## Summary Analysis Results

- Overall changes in traffic characteristics:

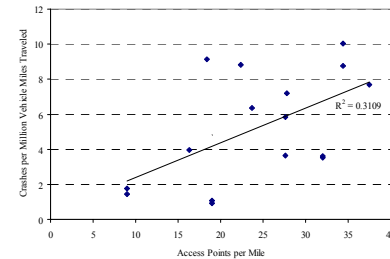
		Crash Rate	Fatality Rate	Access Points per Mile	AADT	Total Cost of Crashes per Year
Analysis Locations	University Parkway	●	○	○	●	○
	Alpine Highway	○	-	-	○	●
	State Street	●	○	●	●	○
	400/500 South	●	●	○	○	○
	300 West	●	-	-	○	○
	Redwood Road	○	-	○	●	○
Control Sites	700 East	○	●	-	○	●
	12300 South	●	●	-	●	●
	Redwood Road	○	○	-	●	○
	St. George Blvd.	●	●	-	○	●
	SR 36	○	-	-	●	●

"●" indicates an increase  
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## Summary Analysis Results

- Relationship between access density and crash rate:



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## Conclusions

- Research was performed to evaluate safety of access management techniques in Utah
- Results showed that access management techniques may not necessarily be effective in reducing overall crashes ...
- However, other safety improvements were consistently observed, primarily the reduction in crash severity along with the corresponding reduction in the costs associated with crashes

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## Future Research

- More corridors are needed to develop a stronger correlation between sites
- A possible correlation was noted between crash rates and the characteristics of the corridors (e.g., land use, # lanes, AADT, etc.), which are being evaluated in a current research project to develop an access management performance index for the state

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## Acknowledgements

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